CARCINOMA OF THE LUNG: A SIX YEAR STUDY*

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THE outlook for a patient who develops carcinoma of the lung is so miserable that many doctors consider it completely hopeless. Because until recently primary carcinoma has been thought to be a rare disease, the possibility of its presence is too often overlooked by the general practitioner. Only after a protracted period of waiting for a turn for the better which fails to occur is he forced to realize that he is dealing with something more than an inflammatory process. Too often, even when the possibility is considered, there is a tendency to procrastinate, in the conviction that, if a tumor is present, the patient is in any case doomed. This tendency is increased by the fact that these lesions frequently occur in heavy smokers whose early symptoms are masked by a long history of cough, and whose illness apparently begins with symptoms of acute infection, symptoms which respond deceptively well to sulfonamide or penicillin treatment. The discomfort of bronchoscopy is a small thing to ask of a patient who is faced with possibility of death from this disease, yet it is surprising how often the chance it affords of establishing the diagnosis early is withheld.

There is now no doubt that the incidence of bronchiogenic carcinoma is increasing. It must be considered as a real possibility whenever persistent cough, chest pain or blood tinged sputum is present, or whenever an unexplained area of density is seen by x-ray which does not clear promptly and completely. Early recognition, as in all malignant tumors, is the key to successful treatment, and it is now certain that surgical treatment can be successful, though the proportion of those cured is still tragically small. In order to gain a clear picture of the situation to guide us in knowing what to expect and to determine how to save more of these patients it is necessary to review the entire picture, rather than to present results in selected groups.

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Vital Statistics: This record presents a review of the experience in an urban teaching hospital of twelve hundred beds, over a period of six years. The records of all patients discharged from the Presbyterian Hospital in New York with a diagnosis of bronchiogenic carcinoma between January 1, 1940 and December 31, 1945, have been reviewed. There were in all 125 patients in whom the diagnosis was made, constituting about 6 per cent of the discharges from the medical and surgical services; in 103 the diagnosis was proved by microscopic examination and in the remaining 22 it was made on evidence from the findings on x-ray, bronchoscopy and clinical course. The high proportion of male to female patients reported in other series was also present in this group, there being 109 men and 16 women, a proportion of nearly 7 to 1. The youngest patient was 34 and the oldest 79, with the usual peak in the 6th and 7th decades. Those operated upon averaged 53 years. Undifferentiated tumors, classified as carcinoma, were slightly more frequent than the better differentiated epitheliomas, but the latter were almost twice as frequent in the operable group, and all of the surviving patients had this type of tumor. The anaplastic "oat cell" tumors constituted only 11 per cent of the entire group, and only one was resectable.

Symptomatology: The symptoms most frequently encountered were cough, pain and hemoptysis, and varied widely with the site of the tumor. In several, metastases caused the first symptoms, six cases first manifesting themselves with cerebral symptoms. Ten patients had no localizing symptoms, complaining only of weakness and loss of weight; several of these were moribund on admission and the accuracy of the history is doubtful. In general the duration of symptoms before admissions was less in the group not operated upon (an average of 5 months in the 79 cases giving a reasonably accurate history) than in the operated group (6.9 months) and it was longer in the resectable cases than those which could not be resected (7.3 months against 5.5 months). This suggests that the resectable tumors are a slower growing group, and corresponds to the higher percentage of well differentiated epitheliomas among them.

Operability: Two-thirds of the group (83 patients) were not operated upon, either because they were not referred to a surgeon, because they refused operation, or because they presented evidence of metastases on admission. No patient was refused operation because of age or because of evidence of chest wall invasion or the presence of pleural fluid

TABLE I

NO OPERATION 83 Patients 66.4%						OPERATION 42 Patients 33.6%			
DIAGNOSIS PRESUMPTIVE 22 Patients 17.6%		DIAGNOSIS PROVED 61 Patients 48.8%				NO RESECTION 13 Patients 10.4%		RESECTION 29 Patients 23.2%	
BRONCHOSCOPY 15 Patients 12%	X-ray 7 Pat. 5.6%	AUTOPSY 12 Patients 9.6%	BIOPSY 49 Patients 39.2%			DIED OF DISEASE 12 Patients 9.6%	DIED OF OPERATION 10 Pat. 8%	Survived Resection 20 Patients 16%	
			METASTASIS 12 Patients 9.6%	PLEURA 10 Pat. 8%	PRIMARY TUMOR 27 Patients 21.6%			DIED OF METASTASIS 17 Patients 13.5%	A 3 2.5 %

TOTAL 125 PATIENTS

unless the latter contained masses of tumor cells. Bronchoscopic evidence of tracheal distortion or mediastinal widening was not considered a contraindication, a point of view justified by the fact that one of the patients who remains well showed marked distortion of the trachea. In several instances, however, these considerations were a factor in deciding against operation without surgical consultation. Definite tissue diagnosis was not considered essential, in fact its lack indicates a peripheral and therefore more favorable growth, as demonstrated by the fact that no positive biopsy was obtained in 22 of the 29 resected cases.

One-third of the entire group (42 patients) were operated upon, and resections were completed in over two-thirds of them (29 patients). The remaining 13 patients were found to have extension of the primary growth into the hilar mediastinum, the spine, or widespread mediastinal lymph node involvement. Local extension into the chest wall or pericardium was not considered a contraindication to resection, block resection being carried out in 8 cases.

Pneumonectomy was carried out in 17 cases. In four the lesion was considered either of doubtful malignancy or sufficiently well localized to be removed by lobectomy. Since all of these tumors recurred, it is doubtful if such a limited resection is justifiable and it has been abandoned. In 7 cases portions of the chest wall were resected with a lobe and in one of these a large portion of pericardium also; in one case pneumonectomy was combined with chest wall resection.

Results: The end result in 39 cases was not recorded, but since these patients all had advanced lesions and were failing rapidly when last seen it is assumed that they died. Twenty-six of these received only diagnostic and symptomatic treatment, thirteen received radiotherapy. Of the 44 followed up to death five received no specific therapy. The average duration of life in this group was less than two months, but this figure is influenced by the fact that half of the group (13 patients) were admitted as terminal cases. Two patients in this group survived more than a year, both having squamous cell epithelioma. It may be questioned whether these patients, both of whom were denied operation because of bronchoscopic evidence of tracheal distortion, might have been candidates for resection.

Thirty patients received radiation therapy only, and three others received radiation after thoracotomy had demonstrated that the tumor could not be removed. One of the latter patients was still alive but failing

TABLE II

	Presumptive	*Proved No Op.*	*Inoperable*	*Resected*	*Total*	*Per cent*
SEX						
Male	17	51	13	28	109	87
Female	5	10	0	1	16	13
Total	22	61	13	29	125	
	17.6%	48.8%	10.4%	23.4%		

TABLE III

Age	*Presumptive*	*No Op.*	*Exp. Only*	*Resected*	*Total*	*Per Cent*
30-39	0	3	0	0	3	2.4
40-49	3	7	6	6	22	17.6
50-59	9	22	3	15	49	39.2
60-69	8	23	4	8	43	34.4
70-79	2	6			8	6.4
Total	22	61	13	29	125	

TABLE IV

CELL TYPE	*No Operation*	*Exploration Only*	*Resected*	*Total*	*Per cent*
Oat Cell	8	3	1	12	11
Carcinoma*	33	7	10	50	49
Squamous Epithelioma	20	3	18	41	40
Total	61	13	29	103	
Per Cent	59	12.6	28.3		

* Includes Adenocarcinoma and undifferentiated Epithelioma.

rapidly, with widespread metastases when last seen fourteen months after operation, having had a full course of therapy to his primary lesion and another to spinal metastases with great symptomatic relief. The average duration of life after radiotherapy was 6.5 months which is not significantly greater than the average life of the patients (excluding terminal admissions) who received no specific therapy. It should be brought out, however, that many of those so treated did not receive adequate dosage, since the therapy was not continued if palliation of symptoms did not occur early in the course. Definite palliation was accomplished in a number of cases, and it seems probable that in these the duration of life was prolonged. No patient gained prolonged palliation or apparent cure.

Of the 42 cases operated upon 13 were not resected. One died postoperatively and the remainder died an average of 5.5 months after operation. This corresponds with the average life expectancy of the unoperated group (excluding the terminal cases) so it may be concluded that, except for the operative mortality, exploration alone does not shorten life expectancy. Nine of the 29 resected cases died in the postoperative period, a mortality of 31 per cent. This mortality may be expected to improve with time, especially since the all important immediate postoperative care of the patients in this group was hampered by the fact that it had to be carried out with a staff depleted by war. Of the twenty survivors, fourteen died of metastatic disease. One patient died of pulmonary insufficiency but was found at autopsy to have a small metastatic liver nodule. Another, who had had an oat cell tumor removed by pneumonectomy, died nearly two years later of carcinoma of the larynx. It is possible that this represented an independent neoplasm, but since both tumors were anaplastic he is grouped with those who died of metastases. One patient who was still alive when last seen, but failing rapidly, with evidence of mediastinal metastases, is also grouped with those who died of metastases. The average life span of these seventeen patients after operation is 15.8 months, a very significant increase over the approximate six months otherwise to be expected. Furthermore the symptomatic relief gained during this period is much greater than the best palliation obtained by radiation. These patients were definitely benefited by their operation even though not successfully relieved of their disease.

Three of the twenty patients who survived resection are alive and

TABLE V

Operation	*Average Age*	*Duration of Symptoms*	*Duration of Survival*	*Post-Op Deaths*		*Died of Disease*		*Apparent Cure*		*Total*	
		Months	Months	No.	%	No.	%	No.	%	No.	%
Pneumonectomy	56	6.6	10.8	7	41	7	41	3	18	17	40
Pneumonectomy Resection of Chest Wall	45	5.5	0	1	100	0	0	0	0	1	2
Lobectomy Resection of Chest Wall	57	9.5	10.6	1	14	6	86	0	0	7	17
Lobectomy	52	7	32	0	0	4	100	0	0	4	10
Exploratory Thoracotomy	52	5.8	5.5	1	8	12	92	0	0	13	31
Total	53	6.9	7.7	10	23	29	69	3	8	42	

apparently free of disease. All had squamous cell epitheliomas removed by pneumonectomy and all three are back working at their former occupations three or more years after operation. The first was a German-American sheet metal worker of 62 who had first noted a wheezing on respiration 9 months before admission. A tumor mass was seen on bronchoscopy protruding from the right middle lobe bronchus which on biopsy proved to be a squamous cell epithelioma. Following pneumonectomy he developed a small cerebral embolus and then an empyema which required open drainage and subsequent thoracoplasty. His wound has now been healed for three years and he carried out a full day's work in a shipyard during the last two years of the war. The second survivor was a Jewish furrier of 40 who had been treated for suspected tuberculosis for 10 months because of repeated hemoptysis. During this period his left main bronchus had gradually become completely obstructed with complete atelectasis of the lung and considerable mediastinal distortion. Following pneumonectomy he developed a small empyema which healed after open drainage. He returned to work six months after operation which is now nearly three years ago. The third survivor is also a furrier, a Greek of 45 who had suffered from symptoms of recurrent pneumonia, yielding to sulfonamide treatment but recurring

as soon as treatment was stopped, for four months before operation. Bronchoscopic examination showed no tumor, but the history and x-ray picture were considered sufficiently suggestive to warrant pneumonectomy, which revealed a squamous cell epithelioma of the left upper lobe. He made a smooth recovery and has been back at work since two months after operation, now four years ago.

Summary

1. A series of 125 unselected cases of primary bronchiogenic carcinoma admitted to a general hospital service over a six year period has been presented.

2. In two-thirds of the group diagnosis was made either at autopsy or so late in the course of the disease that no operation was considered justifiable.

3. Of the group of 42 patients operated upon, it was possible to carry out some form of resection in 29, with a hospital mortality of 31 per cent.

4. Only 3 of the 20 patients surviving resection remain alive without evidence of metastasis, but the lives of those who died of metastasis were prolonged and their symptoms were alleviated.

5. Radiation therapy has not increased the life expectancy in the group treated as compared to those untreated, but in many cases it has relieved symptoms and in some it has probably prolonged life.

6. Three patients are living and apparently well without physical or economic disability 3 to 4 years after pneumonectomy.